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Post Flight Dynamic Analysis Simulation

The problem:

To obtain post flight simulation of a vehicle using actual flight data as input.

The solution:

The Post Flight Dynamic Analysis Simulation program is a digital six-degrees-of-freedom, open loop Saturn V first stage flight evaluation simulation.

How it's done:

The program is designed primarily for post flight simulation of the Saturn V vehicle using the actual flight data as input. Results are compared with measured data and used to analyze and explain any anomalies occurring during S-IC flight. Similarly, for pre-flight analysis the program uses predicted flight data as input. It utilizes a Z-transform control system and a Runge-Kutta-Gill integration scheme. The general capabilities are: coupled flex and slosh dynamics; a first or third order actuator model; distributed aerodynamics; and off-nominal and malfunction operation. Output is a printout, a plot tape and a USAF format flight evaluation tape.

Data tables and/or as many as six post flight tapes comprise the input. Input data include vehicle physi-

cal characteristics as well as in-flight environmental data as follows: individual engine thrust, lumped mass characteristics, atmospheric parameters, wind data, aerodynamic drag and system misalignments.

Notes:

1. This program, originally applied to Saturn V evaluation, has good potential for industrial application. Analytical simulation could form the model for predicting /studying the dynamics of major systems interaction.
2. The program is written in FORTRAN H language for use on the IBM 360 computer.
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